

Automation of Waste Paper Reject Handling System using DCS

Abi. R¹, Gayathri. C¹, Gowsalya. K¹, Mr. Ravishankar Kandasamy², Mrs. Sudha. N³

¹Student, ²Associate Professor, ³Plant Engineer (TNPL),

^{1,2}Department of Electronics and Communication Engineering,

^{1,2}Paavai Engineering College, Namakkal, Tamil Nadu, India

³Karur, Tamil Nadu, India

ABSTRACT

The main objective of this project to dispose the reject material properly and reduce the environmental impacts. This is a Deinking process (DIP). Deinking process is the one in which the ink from the office waste and newspaper and removed in order to prevent it from dispersion into the pulp sodium soap is used for removing the ink. The sodium soap produced in conveyer. The existing method have only one conveyer. It carries the reject material and it create the environmental hazards. But our proposed method has two conveyers. These conveyers are worked with the help of DCS. It reduces the environmental pollution and reduce the need for more manual labor. The conveyer 1 has a magnetic separator which separate the metal, iron and its components. The conveyer 2 has a reject material like polythene and reject material. Those materials are conveyed Baling machine by using the conveyer 2. Finally, all the reject materials are bundled by using the baling machine.

KEYWORDS: Motor (3 phase), Magnetic separator, Conveyor, ABB-DCS, AC800M controller

How to cite this paper: Abi. R | Gayathri. C | Gowsalya. K | Mr. Ravishankar Kandasamy | Mrs. Sudha. N "Automation of Waste Paper Reject Handling System using DCS" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-2, February 2020, pp.1137-1140, URL: www.ijtsrd.com/papers/ijtsrd30160.pdf



IJTSRD30160

Copyright © 2019 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



I. INRODUCTION

A distributed control system is a computerized control system for a process. It has many control loops. A distributed throughout the system with each component sub-system controlled by one or more controllers. The control systems is connected to the communication medium. It is used to monitoring the networks. DCS is a broad term. It is used in many types of application. Its monitor and control the distributed components. Beginning of the DCS devices that controlled process and turned valves on the site modeling of the system is made by DCS and it allow the ability to record and managing process. Because DCS is used to control process control remotely and gain of how they can be improved to both increase safety and profit and how the process operates the possibilities. Transmit information is used to find the output of the instrumentation in field. In this process we are using electrical buses and multiplexer buses. It connects to the processor and modules and multiplexer buses are connected to the central controller to distributed controller. It is used in HMX (human-machine interface). DCS system are deployed in operations may cause material and personnel losses. Increasing the investments to the control system to prevent the possible to include redundant solution. Redundancy are nowadays standard built in options for DCS and also its not necessary for them to write a custom program. It is related with online and offline applications changes. A DCS acts to run non-stop for gears.

DCS (distributed control system) systems denoted as dedicate systems. It is used to manufacturing processes. central station power generation is used to generate the power. It is also used to more application like cement production, paper making and steel making. The most popular example is a setpoint control loop which consist of pressure sensor, controller and control valve. The flow measurements are transmitted in signal controlling of input/output(I/O) device.

II. PROPOSED SYSTEM

In this proposed method, the waste paper is obtained from the waste products. It has two reject conveyors. The two reject conveyors are connected in serious connection. The two reject conveyors are operated in based on time. The reject conveyor I consist of metal separator which is used to separate the metal from the reject wastage. Then the reject waste material is passed through the bailing machine with the help of reject conveyor II. The reject conveyor II carries the waste materials such as polythene and etc. The metal separator attracts the metals and iron components. The obtained metals are passes to the scrap yard. In this scrap yard this metal is melted and its used to reproduce another metal product. The polythene papers are sent to the kiln and its used in cement plant for raise the temperature. The reject conveyor II having the waste papers which is passes to the

bailing machine. After receiving the bailing machine, the papers are compressed and its bundled with the help of iron strip. Then the reject conveyor I and reject conveyor II works at simultaneously before filling the bailing machine. When the bailing machine was filled the reject conveyor II works based on the timer, we set the run time and stop time

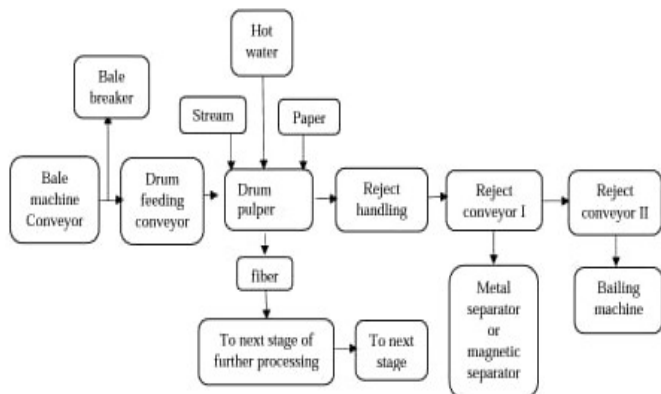


Fig1. Block Diagram

III. HARDWARE IMPLEMENTATION

A. MOTOR (3PHASE)

A electric motor converts the electrical energy into mechanical energy which has different types of loads. A.C (Alternating Current) motors operates on a power supply which has classified into

- Synchronous motor
- Single phase motor
- 3phase motor

When a 3phase induction motors are most widely used for industrial applications mainly because they do not require any starting device.

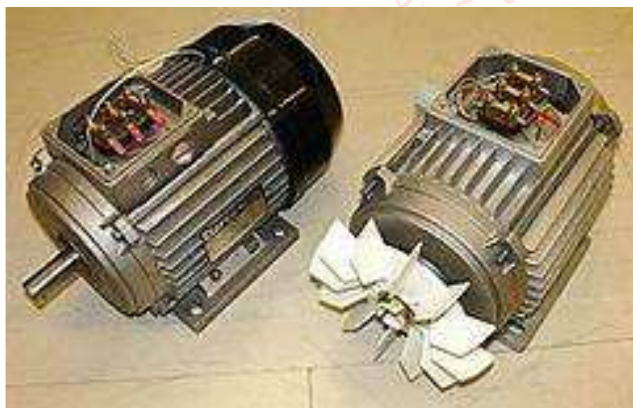


Fig2. Motor (3Phase)

In an 3phase induction motor, the rotor current is introduced by the magnetic field, instead of electrical connection. The principle of this motor is based on the production of RMF. (rotating magnetic field) which is used to rotates the motor at synchronous speed. The direction of rotation of the motor is depends on the sequence of supply lines and these lines are connected to the stator. Motors are commonly configured to have 2,4,6 or 8 poles.

Synchronous speed of rotation = $(120 \times \text{supply frequency}) / \text{Number of poles on the stator}$

B. CONVEYOR

A conveyor belt is used to carrying medium of a belt conveyor system. The many types of conveyor based upon

the work. A belt conveyor is one of the conveyors. In this belt conveyor system having of two or more pulleys. It's carries the medium conveyor belt that rotates. These two pulleys are more powered. It moving the belt and these material passes to the forward direction. There are two types of pulley available one is Powered pulley another one is Unpowered pulley.

This Powered pulley is known as drive pulley and Unpowered pulley is known as idler pulley. This material is used to transport large volume resources. Finally, it produced agriculture material like sand, ore, coal, salt, grain and etc., Transport product through changes in elevation or Its direction by using belt conveyor. It produces the bulk materials like grains, coal, sand and ore etc.,



Fig3. Conveyor

C. MAGNETIC SEPERATOR

A magnetic separator is a device which is used to remove the impurities and magnetic materials. It can be used to make the production of a materials and It can be adjusted to attract different types of materials at different intensity levels. It is use almost industrial in nature. A magnetic separator is used for variety of application. It can be ferromagnetic or paramagnetic and It can vary in size. Heavy drum used in recycling and more manufacturing application.



Fig4. Magnetic Separator

D. BAILING MACHINE

A bailing machine is used to bundle the waste material with help of humans. A baler is called hay baler is used to compress a cut and raked crop. The compact baler is easy to handle. Transport and store bales to preserve by using some intrinsic valve plants are bundled. Each of the plants producing a different type of bale which is find out in cylindrical of various size, strapping. the different types of balers are used in this method of bailing machine Due to this ability for bales. They require specific treatment for safe transport and handling.



Fig5. Bailing Machine

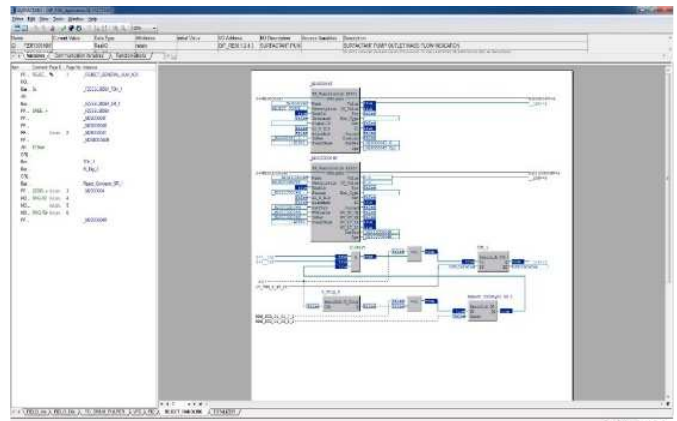


Fig7. Control Builder Logic 1

E. SELECTOR SWITCH

Selector switches are available in various of styles and also it has illuminated, non-illuminated key operated. The styles offered range from maintained or sprains return and 3-50 amps. The selector switch work with specialist to determine the best product for your application. In this product is mainly focus on the construction and functionality of non-illuminated selector switches.



Fig6. Selector Switch

IV. SOFTWARE IMPLAEMENTATION

A. 800 XA CONTROL SOFTWARE AC 800M ENGINEERING

AC800M control application can be created in any of the five IEC 61131-3 dialects using the control bulider. It can be downloaded to controllers using the control builder. It can be distributed and excuted on several controllers and control network using named variable communication. Part of the application can be downloaded to different controllers. The fuctionality range for control application is wide and it's control to closed loop control with more advanced functions like fuzzy control, auto tuning PID, etc., Predefined process objects like valve objects, motor objects, etc., User define function block are possible to build and also to protect the intellectual property. User define serial protovals can be developed in structured text and it's support the special fuctions needed.

It have several type of control loops, including advanced control and auto tune capabilities as well as integration for ABB drives and motors. The controller communication is an ethernet. It's includes on broad RNRP redundancy. This broad set of communication modules is connect to third party devices. Superior redundancy allows for fast switch-overtimes. In this superior redundancy topologically seperated CPU modules and It have several CPU modules available. It varying the terms of processing power, memory ize and redundancy support.

V. CONCLUSION

In here we have introduced another reject conveyor for controlling the reject material levels during increase waste material. The reject conveyor II is playing the major role in our project. Here the reject handling conveyor II is used to saving the time and controlling the environmental impacts and reducing the more manual power. Then the reject material passes to the bailing machine and it's furtherly used some other purpose like cement plant, scrap yard.

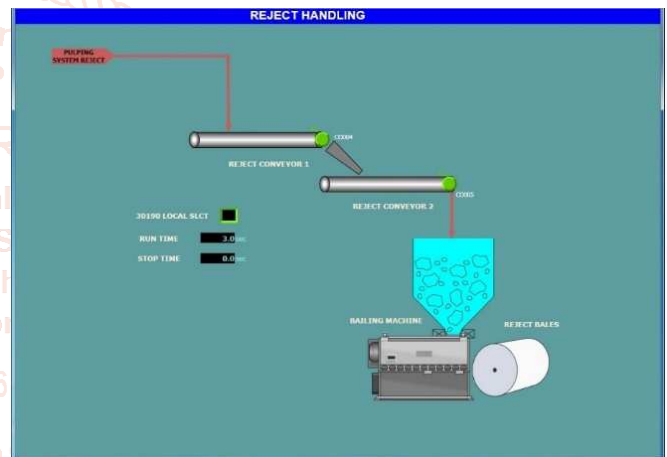


Fig8. Reject Handling System

REFERENCES

- [1] Automatic waste segregator, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue4S, February 2019.
- [2] Automatic Broke Feeding System for the Finishing House Pulper in Paper Machine. Ravichandran 1, Aravinth S. A. S 2, Dinesh M 2, Madhu Johny 2, Mohanasundaram K.S Asst. Prof., Department of EEE, Nandha Engineering College, Erode, India 2 UG scholar, Department of EEE, Nandha Engineering College, Erode, India.
- [3] A critical review on waste paper sorting techniques, M. O. Rahman A. Hussain H. Basri. Received: 20 September 2012 / Revised: 10 January 2013 / Accepted: 23 February 2013 Published online: 4 April 2013 Islamic Azad University (IAU) 2013.
- [4] Color/ Metal sensing sorting system, Pankaj Agarwal, Ratnesh Kumar tiwari, Samardeep Banyal, Santosh Kanigicherla, Shivang Chaudhary Department of Electronics and communication, SRM Institute of Management & Technology, SRM University, NCR Campus

- [5] Development of Automatic Smart Waste Sorter Machine, Mahmudul Hasan Russel^{1*}, Mehdi Hasan Chowdhury, Md. Shekh Naim Uddin¹, Ashif Newaz¹, Md. Mehdi Masud Talukder² Department of Electrical and Electronics Engineering¹, Department of Mechanical Engineering² Chittagong University of Engineering and Technology (CUET) Chittagong-4349, Bangladesh.
- [6] Fiber Recovery from Waste Paper: A Breakthrough in Re-Pulping Technology, Jerry Aue, Energy Center of Wisconsin Keith Picard, Buttonwood Consulting, LLM.
- [7] Sorting of Objects Based on Color, Weight and Type on A Conveyor Line Using PLC, S. V. Rautu, A. P. Shinde, N. R. Darda, A. V. Vaghule, C. B. Meshram, S. S. Sarawade (Department of Mechanical Engineering, M.E.S. College of Engineering, Pune, S. P. Pune University, India).
- [8] State-of-the-Art Reject Treatment Systems for Recycled Fiber Lines, Avinash P. Kaldete ¹, Sachin A. Kulkarni, Assistant Professor, Sinhgad college of engineering, Vadgaon(B.K.), Associate Professor, Sinhgad college of engineering, Vadgaon (B.K.), Pune.
- [9] Potential benefits of recovered paper sorting by advanced technology, "Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, 71, Dimitrie Mangeron Blvd., 700050 Iasi, Romania.

